DISK DRIVE TIDBITS

by David A. Land
10020 Fontana, Overland Park KS 66207

It's truly amazing how many people read MUG Newsletters or become aware of them through friends, business associates, etc. After the MUG ran my original ad, I got calls from all over the country from businesses, individuals, schools, etc: a lot of people who needed just a little help to get their Micriopolis drives back to work again. My price list may look long and scary, but our average repair bill has been running under $65 per drive (including return shipping). As a lot of our work comes from companies with Quality Assurance Departments, we now include a written Service Report with all jobs, detailing what we found and how we fixed it.

Although we have had some real challenges, we still can say we haven't ever had a Micropolis drive we couldn't repair. I have quit making drastic assumptions, though.

For instance, one would think that a drive previously in use for many years, and recently inoperative, would have its basic wiring intact, wouldn't one? (WRONG!!!!) One would also think that a relatively sophisticated piece of machinery like a disk drive would be packed with extra care – especially when the sender's continuing business was dependant upon it! (WRONG!!!) And you would think that others servicing disk drives, even if not as experienced as they ought to be, would know that there is more than one adjustment necessary to properly align a disk. (WRONG, WRONG, and WRONG again!!!)

WIRING

My favorite (?) repair job so far involved a drive which just wouldn't align properly. At first this one looked easy – just needed a little cleaning, a little TLC, and a good alignment. But then it wouldn't pass the Micropolis Diagnostic's verification test (X3). A recheck showed that the circumferential alignment was way off ... maybe it slipped?

Now, just to make sure all of you enjoy this one as much as I did, perhaps I'd better digress to explain circumferential alignment. This adjustment sets the distance, measured around the circumference of the diskette, between the sensor which "sees" the index and sector holes (the platen assembly on Micropolis drives) and the read/write head. This is adjusted by means of a precisely-recorded burst of data on an alignment disk.

We use an oscilloscope to measure the time from when the index hole is first "seen" to the front part of that burst of data. Since we know the velocity of the diskette (you must always set the motor speed before making this measure-ment!), we can use this time to determine precisely the head-to-platen spacing and adjust accordingly.

Back to the story ... We adjusted the platen and re-tested the drive: no good. A recheck showed that the circumferential alignment was way off again! So we got out the Loctite and tried again ... same thing. After two or three more tries, we decided to eat dinner and think about it some more. Was the drive's bedplate bent? No. Was the platen assembly cracked, causing it to slip? No. How about my old faithful alignment disk ... was it finally ready for retirement?

Thinking I was on to something, I tried another alignment disk. Sure enough, the circumferential timing was different with another alignment disk. But which alignment disk is correct for sure? No problem ... I have two more new ones locked away for just such an occasion ... just repeat the measurement with these, and ...

Disaster! Four alignment disks (two of them brand new), and four different readings!!!! Each individual disk's reading was repeatable with that disk. The drive would exhibit about two or three errors on each verification pass with any of the four settings. Time to sleep on this problem...

Working in the yard the next day, I finally thought of a new approach to the problem ... Back to basics! As a diagnostic exercise, I pulled out the drive motor and temporarily replaced it with a new one. Success! All four alignment diskettes gave me exactly the same reading!

A closer examination revealed that the old drive motor had been wired into its plug backwards! Because of the way the speed control circuit works, it was satisfied that the motor was turning because it still got a valid tachometer signal, but the spindle was turning backwards! Since the length of the precisely-recorded data burst on each alignment disk is not controlled, this explained the apparant difference among the four alighment disk: I was actually measuring the distance from the platen to the back of the data burst!!!

More amazing still was the fact that the drive still was able to read and write reliably on most of the outer tracks despite the fact that the head was passing over the media backwards! Anyway, I now check wiring first when anything doesn't work.

PACKING

You all know that Micropolis was a pioneer in the manufacture of floppy disk drives. What you may not realize is that Micropolis was also a pioneer in the shipment of floppy disk drives by common carrier all over the world. When they first started shipping the 1053 subsystem to computer stores, they made several test shipments. Some of these test shipments contained multiple-axis recording accelerometers to see whether Parcel Post or UPS dropped the packages harder. Other shipments just tested different methods of packaging. Micropolis learned, and UPS learned, how to handle these items successfully.

On a packaged drive such as a 1042 or a 1053, you will note that the drive modules are suspended by four special plastic mounting nuts. These nuts are designed to give a little when the drive receives a jolt, but to break off if

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******************************************************************************
*                                                                            *
*       FACTORY QUALIFIED, EXPERT SERVICE FOR YOUR MICROPOLIS DRIVES         *
*              (One week turnaround on most jobs, too!)                      *
*                                                                            *
*                    PRICE LIST, MAY 1, 1985                                 *
*                                                                            *
*  Normal Alignment for 1015 or 1016, Mod I or Mod II ..............$35.00   *
*  Normal Alignment for 1053 Mod II (Dual Drive) ...................$50.00   *
*                                                                            *
*                   "Normal Alignment" includes:                            *
*                                                                            *
*     Clean and Inspect Heads          Track Zero Switch Adjustment         *
*     New Pressure Pads as Needed       Lead Screw Lubrication               *
*     Door Open Switch Adjustment       Door Latch Adjustment                *
*     Motor Speed Adjustment            Centering Cone Adjustment            *
*     Circumferential Alignment         Positioner Step Timing Adjustment    *
*     Azimuth Alignment                 Read Amp Gain Adjustment             *
*     Radial Alignment                  Write Protect Switch Adjustment      *
*                                                                            *
*                  Verification with Micropolis Diagnostic                   *
*                                                                            *
*                                                                            *
*                                                                            *
*          Other repairs are NOT included in "Normal Alignment"             *
*                                                                            *
*  *Spindle Motor Replacement (Parts & Labor) .....................$58.00    *
*  *Receiver Assembly Replacement (Parts & Labor) .................$125.00   *
*  *Head/Carriage Assembly Replacement (Parts & Labor) ............$225.00   *
*  *Stepping Motor Replacement, Quad Density (Parts & Labor .......$90.00    *
*  *Spindle Assembly Replacement (Parts & Labor) ..................$55.00    *
*  *Disassembly, Removal of contaminated grease, Reassembly ........$5.00    *
*  1015 Controller Board Exchange Price ("Single B" Version only) ..$75.00   *
*  S-100 Controller Alignment (Micropolis/Vector Graphic)...........$20.00   *
*  S-100 Controller Exchange Price (for reconditioned board).......$75.00    *
*  Other repairs @ $35/hour plus parts .....................$Reasonable     *
*                                                                            *
*  "*" Denotes repairs which MUST be followed by "normal Alignment"         *
*                                                                            *
*                        Dave Land, 10020 Fontana                           *
*                     Overland Park, Kansas 66207                           *
*                  Call (913) 648-1373 after 7:00 PM Central Time           *
*                                                                            *
******************************************************************************
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the bump is too severe. It is better to break an easily-replaceable plastic mounting nut than to bend the metal plate on which the drive is built.

Another feature which helps Micropolis drives reach their destination safely is the flexible mounting for the positioner. The positioner, which is a stepper

motor attached to a precision lead screw, is mounted on a leaf spring which is preloaded to push the positioner into a bearing mounted on the spindle assembly.

This was done in order to achieve accuracy. The bedplate has nothing to do with accuracy of track-to-track positioning because the positioner is referenced directly to the spindle and not through the bedplate. If the drive receives a severe jolt along the positioner axis, the leaf spring merely absorbs the shock. Most of the time, the recipient of the drive will never know the unit was jolted; but if the jolt is especially severe, the positioner can pop out of the bearing on the spindle.

If you receive a drive in this condition, you can usually pop the positioner back into place without loosening anything - and you will usually end up with a unit which is still correctly aligned. After you re-seat the positioner in the bearing, tap the center of the stepper motor lightly but sharply with the handle of a scrwdriver to make sure the lead screw is firmly seated.

If you find it necessary to ship a drive:

1. Find a carton which is about twice the size of the drive in all dimensions.

2. Wrap the drive tightly in plastic, or enclose it in a plastic bag. A one-gallon freezer bag just fits a 1015 module. Trash bags work fine, too. Don't forget to seal all openings in the bag or plastic wrap. This will prevent condensation, as well as keeping the packing material from entering the drive mechanism during shipment.

3. Cushion the drive in foam, plastic peanuts, wadded-up newspaper, or popcorn. If you are using popcorn, skip the salt, cheese, caramel, and butter when making it for packing. When properly packed, the drive should be centered in the carton and surrounded on all sides by packing material.

4. Always put your return address on the package in at least two separate places.

You best carrier depends upon your location, but generally I find that UPS does a superior job transporting drives.

SELECTING A SERVICE ORGANIZATION

There must be (or have been) plenty of good service organizations out there, or there wouldn't be so many successful Micropolis users. Unfortunately, I don't generally get to see the work of the good ones.

I see drives which have supposedly been recently aligned still containing worn out pressure pads, too much of the wrong kind of grease on the positioner, sticky door latches, and generally filthy inside.

I also see a lot of drives which have been given a radial (cat's eye pattern) alignment only: no circumferential, no azimuth, no read amp gain adjustment.

If you are considering a new service agent, I suggest you <u>ask</u> about these things. I've described circumferential alignment elsewhere in this article. Can your prospective service agent explain to you how he is going to do this? Does he know how to check azimuthal alignment? Does he know the importance of read amp gain and how to set it on a Micropolis drive? How does he test your drive to verify that the alignment is correct and complete? Does he have factory training of any kind? (Much of the theory and basic test procedures are common to all brands of disk drives).

Hopefully, a little care in selecting a service agent will save you much lost time and frustration later. And if you <u>do</u> find a new source of good service, let MUG know about it!

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VG USART SET-UPS

(C) COPYRIGHT 1985 by Edward W. King.

I have written two short and sweet programs to stuff a 4Fh mode code into the USART through Status Ports 3, 5, and 7, and they both work! I not only confounded my printer with the change, but I ran MODEM7 successfully at 300 baud with my switch set to 1200. I pushed myself to code these for both a ZSM and an ASM assembler: UZARTSET was written for assembly via ZSM, and USARTSET via ASM. (The "4F" mode permits use of MODEM7 to transmit both ASCII and COM [binary] files, that protocol being: 1 stop bit, no parity, and 8 data bits; the ratefactor is *64, so communication would be at 1/4 the switch-set baud rate. A "4E" would make the baud rate the same as the switch rate.)

In USRCHART.MEM I have set up the Mode Byte charts for easy reference.

I stuck 50h into one of these programs as the internal reset command byte which must immediately precede the sending of a MODE change byte to the USART. That value accomplishes also the resetting of the three error flags. Neither Dr. Harp's reset command byte (40H) nor his first command byte (27H) following mode change, does such a flags reset. Whether that b4 is "0" or "1" has no effect upon the operation of the USART, says the Intel literature. But the Application Note does say that an "Error Reset must be performed whenever RxEnable and Enter Hunt are programmed" -- and the 27H [first command byte in the Harp routine for a mode change] does an RxEnable. Maybe a first command following a Mode change does an automatic flags reset? (Those Application Note statements are presumably not contradictory.) Anyway, I figured it couldn't hurt to do the flag reset too. Some program just might be looking for a No-Error flag there right after a mode set or reset, and just maybe the Mode reset procedure and the 27H do not reset the error flags.

To my 2 quick little USARTSET and UZARTSET programs, I have now added a much more sophisticated 8251 USART control program, SET/8251, which is a modification of a public domain program written by John M. Kodis and made available on CP/MUG Volume 81. His program is called BAUDSET.ASM, but that name is misleading for the program does much more than permit only a baud rate modification:

with it you can set all aspects of the 8251 USART protocol mode byte --i.e. you can set the # of STOP BITS [1, 1.5, or 2]; PARITY type and activation; # of DATA BITS [5, 6, 7, or 8]; and RATEFACTOR [1, 16, or 64].

And Kodis´ program handled the settings for not only the Intel 8251 USART, but also (with code which I have eliminated) the settings for 2 TUARTS -- one or all of which are found on the Micromation Doubler Board and on Cromemco machines.

My first chore was to study the program to understand at least roughly what it was doing, and at least approximately how it was doing it. Then I began to whittle the Kodis code down to cover only the 8251 USART device, eliminating the Device choice table and all the code for the TUARTS.

Next, having studied and and understood the USART initialization routine used in the Vector Graphic ROM MONITOR (as revealed by its .PRN file in the Monitor section of the manuals) and borrowing from that code, I substituted similar code for sending the Mode bytes out ports 3, 5 and 7 in place of the Kodis code -- which, I had discovered, was written for a memory-mapped 8251 USART.

It took me some time to realize that I was looking at Memory-Mapping for real and in the flesh: suddenly ´seeing it actually happen´ made it much more dramatic than the mere reading about it. I was fascinated by the fact that the mode code and other setting bytes were just sent to one memory address, byte following byte, where they ´disappeared down the hole´ as it struck me. (Yet what else is port mapping? One byte follows another down the BUS, sent to the same port address.)

After I had tested the pared-down and re-written basic code and found that it worked (testing it by hooking my Vector to my Kaypro and sending data back and forth with a few changes in the protocols) I began adding my own messages to the Kodis code: first, a message to advise the user what default Hex Mode Byte had been inserted if he had made no choices.

But my simply indicating via a canned, immutable message that the program was or would set a default mode choice of "4F" if no settings had been specified on the command line seemed too simple: and a little further reflection made me realize that such a message was not only sufficiently univeral to cover the situation if someone had changed the default by poking in a different mode byte or otherwise; and also it would be dead wrong if someone had merely run the program, once, making one or more changes, and then re-ran the program without giving any input the second time. So the challenge was to write code to make the machine copy the actual mode byte from memory for its inclusion in the message.

Ah, but then how could the machine show that binary Mode byte in its Hexadecimal representation on the screen? Another challenge! I had to find code that would translate it! Back to the books. And as my .ASM file notes, one of Prof. Miller´s books led me to some neat, appropriate code.

With that code in place, I was able to add a more ´universal´ message to advise what Mode byte had been chosen (or was left there from a previous change) as the default byte if no different protocol choices were made. In that further contemplation of the code, I had also come to realize that if one kept the program up and running, making one change after another with it, the previous change(s) would become a factor in making subsequent changes: any factor left unchanged from the last previous change would remain in that mode -- not taking the default mode characteristic.

Next I graduated to trying to add an entire additional screenful of helpful information to let one know exactly what the choices or options were for resetting the mode --and to include the advice that Synchronous mode was not directly supported by the program as written, but that it too could be set by poking an appropriate Mode byte into the program to achieve such a setting as a ´default´ setting. [Maybe I should also have advised on the screen that doing a hardware reset would take the mode back to the cold boot initialization Mode of CE - viz. 2 stop bits, no parity, 8 data bits, and the switch-set baud rate; that happens even though the reset itself does not involve an entire cold boot initialization.]

To come up with a screenful of help messages, I had to learn how to achieve a clearscreen command; and then I had to learn how to turn over control to the use r -- to let him "Hit any key" to bring on that next screenful of information. [I still haven´t figured out why CP/M´s Function 6, which I first tried to use, gave me a lot of trouble: I abandoned it in favor of using Function 1 instead. Must go back and try that function 6 some time.] Next I experimented with REVERSE VIDEO in the messages. Great fun!

Finally, I universalized my code by using labels, so that with a few alterations in the EQU statements up front (in the ASM file) one can get this program to run on machines other than Vector Graphic; and by ´commenting out´ the OUTPORT section and slightly editing some of the messages, I also created a disarmed, non-functioning version [SEEBYTE] which will not actually reset the USART (for it does not sent the 6 bytes out to the ports), but will instead just give you the messages to tell you what the Hexadecimal value would be for the 8251 MODEBYTE which has been constructed by your choices.

This ´inoperative´ "SEEBYTE" version of the program can be run on the Vector, of course, and also works on my Kaypro, though the reverse video codes produce only Greek lambdas (or was it gammas -- now I have forgotten) rather than reverse video on the Kaypro. It should work or be fairly easily adapted to work on other machines as well. Since it is a mere information generator, it will not send strange bytes to places undesired. I left the 14H reverse video toggle code in place anyway: it could be removed or replaced with the proper code. if you don´t want the Greek alphabet or other phenomena cluttering a screen which does not use that particular byte for a reverse video toggle.)

The programs are being left in the public domain for personal and hobbyist use, of course. I have left the .ASM program in a somewhat ragged condition, leaving it untidy and stopping far short of doing everything one might want to do to fancy up its looks and the operation of the program -- for since I found

it to be a great vehicle for learning by doing, I invite and encourage all who want to try their hand at assembly programming to go ahead and play with it and practice on it.   FOR EXAMPLE:

(1) One might try to add code to interpret and advise by screen messages what the chosen setting (e.g. 4F, 5E, etc.) means -- what protocol or characteristics have been [or would be] set by it.

(2) And then there is the possibility of adding a front-end menu for selection of the protocol items.

(4) Translate the .ASM file to make it assemble using ZSM. (That might amount only to changing the format of some or all of the reservations of space for messages: I havent tried to get it into shape for ZSM.)

(5) Or insert code to call up a HELP screen of messages right away if a "?" or "HELP" is typed right after the command.

(6) I put the Mode Byte charts into the .ASM source file as Comment. One might code it to have it (or them) printed as another screen message to be triggered by a "Press any key" or other invitation.

(7) And one might try to expand the code to cover SYNCHRONOUS mode settings as well as the asynchronous; and to explain ISOSYNCHRONOUS (*1 Ratefactor) operation.

(8) Use the program as a pattern for adjusting (and revealing the content of) any configuration byte. (Perhaps CONFIG or USER.ASM could be dressed up to reveal the chosen settings at the end of a run.)

[All of the source and executable versions of USARTSET, SET/8251 and SEEBYTE are on MUG CP/M Library Disk 1913. Additionally, Ed included the Kodis BAUDSET.ASM (and BAUDSET.DOC) code, just in case someone needs the memory-mapped route code to reach his 8251.]
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FLOPPY DRIVE PRODUCTION TO CEASE

As Lynn stated last month, we had heard rumors of Micropolis' intention to stop producing floppy disk drives. This month we received official notification from Chet Baffa, Micropolis Vice President of Marketing and Sales. Portions of Chet's letter are reproduced below.

"Micropolis Corporation has been a leader in providing innovative new products to our customers for eight years. For some time, our 5 1/4" floppy disk drive products were considered to be in that category. Most of our FD customers, however, have been aware for some time that the Company's direction has been focused in the high performance 5 1/4" Winchester product area, where the Company has established a leading position in 52 and 85 mbyte drive shipments.

"What all of this means to our floppy disk business is that the time has now come to phase out production of the 1100 Series of floppy disk drives. All of our customers have been notified verbally of our plans in this area, and it is my purpose now to inform you officially that shipments of the 1100 Series floppy disk drives will cease by the end of 1985. You may feel assured that the drives you now have on order will be available on schedule, and our sales staff will be available to develop "wind-down" shipment plans if such is required. Spare parts, of course, will continue to be available.

"On behalf of Micropolis Corporation, I want to express our appreciation for your floppy disk drive business. Hopefully our 5 1/4" Winchester products are products that will enable Micropolis to continue to fill your requirements."

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SHOULD YOU GET A DRIVE?

There are probably a lot of you who don't know what to think about this cease of production of Micropolis drives. "Should I get one? What would I do with it? If I just buy as insurance, how do I know it works now? How would I install it?" Let's see if I can answer a few of these questions.

If you're running a Micropolis drive, single or double sided, you intend to keep your system for two years, and it will impact your activities if a drive goes bad, you probably should get a backup drive.

It isn't that you can't get your current drive fixed. People such as Dave Land and Chapman Computers will be able to fix your current drive for many years to come. It will take a lot longer to do so, however, because parts will take longer to acquire and, unless you live in Overland Park or Marietta, you can't get your repair work done locally.

That doesn't mean you have to buy a new 1115. There are used 1015s on the market. DAMAN and the MUG will try to locate these drives, as well as parts for Vector Graphic, and make them, or their location, known to you readers.

The 1115 is a quality drive, though. Much more durable than the 1015. Faster and quieter. If you buy from DAMAN, you get a 60-day unconditinal guarantee, and DAMAN will always aid in any installation problems. If you don't want it, send it back for a refund (less shipping). Vector owners should consider the bare drive. Others most likely need a subsystem, that is, a drive in an enclosure with a power supply. Both types of owners can consider an add-on subsystem. Then you'll have 3 or 4 drives on line all the time, and the ability to send one or more out for maintenance without putting your system down. That's assuming you don't rewrite all your software to require 3 or 4 drives.

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LETTERS

Buzz: Just a note to inform you that Chapman Computers, Inc., has moved to a new and larger facility. The new address is 1903 Powers Ferry Road, Suite 150, Marietta GA 30067. Our phone number remains the same, (404) 951-1913.

Users in the group may be interested in some of the used Vector Graphic Computers we have for sale. These machines are one-year old, hardly used, and capable of running all Vector Graphic software.

System Specification	Our Price	Originally
(2) V4-40, 10MB, 128 K	$ 2500.00	$ 5995.00
(1) 5005E/2, 5MB, 2 User	$ 3500.00	$ 8090.00
(1) 5032E/1, 32MB, 1 User	$ 3500.00	$ 8995.00

Also, Chapman Computers repairs Vector equipment. Prices on some of the basic Vector Graphics and printer modules are listed below. These are exchange prices, i.e., you send in your non-operating module and we send you back a refurbished operating module. Chapman gives a 90-day warranty on these modules.

MODULE	PRICE	MODULE	PRICE	MODULE	PRICE
8" DISK CTRL	$180	POWER SUPPLY V4	$205	OKIDATA ML PCBS	$112.50
ZCB	112	MICROP FLOPPY	350	QUME SPRINT PCBS	112.50
64K RAM	105	5 1/4" 5 MB HD	350	EPSON PCBS	112.50
V3 MOTHER BD	77	5 1/4" 10 MB HD	395	DIABLO 620/630 PCBS	112.50
V5 MOTHER BD	98	5 1/4" DS/DD FD	162	TI 810 PCBS	112.50
FWII/FWIV	160	5 1/4" SS/DD FD	135	NEC 35/77/55 PCBS	122.40
FD/HD CTRL	180	DS 180 MOTHER BOARD	135	NEC PWR SUPPLIES	122.40
FD CTRL	180	SBC-VSX NO MEMORY	350	V3/V4 VIDEO DRIVERS	50
I/O II	160	KEYBOARD	77	FD/HD SS	220
SBC V4	320	SABERNET	180	128 A/O V4	105

Frank Housley, Chapman Computers

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Buzz: Wonder if you could supply the following for my Vector 2600: Additional memory board to increase memory past 64K (kit would do fine..can do work myself); 8" drives for format SSSD IBM 3740; anything else to improve unit. Albert Balk, Pyramid Electronics, Inc., 353 East 76 St., NY NY 10021. Phone 628-6500.

Albert: No, I can't. At the moment, Vector hasn't set up any mechanism for DAMAN to obtain parts. I hope that the answer will soon change to yes, as I have had conversations with Vector that are incouragaing.

But maybe I can supply some information. The additional memory board, and the required software modification, can be purchased from Vector, as an Extended CP/M kit.

You can also install a program called Cache/Q. It functions as a disk and/or print buffer, using either a single or double bank of memory. It is, therefore, essentially the same as Extended CP/M (CP/M 3.0), but not restricted to the Vector. I have the software in inventory, but have not tried to install it. Perhaps I'll find time before next month's newsletter.

Vector can also supply an 8" controller, software, and drives that work with the Micropolis controller and single-sided 5 1/4" drives. Whether a similar system is available for your double-sided Tandons is unknown.

There are two versions of a modified CP/M from Hawkeye Graphic that are available for $250 each. One version is for the Micropolis controller and your choice of Tarbell, CCS or Advanced Digital 8" controllers. The second is for the Vector HD/FD controller and allows a Tandon 503 (20 MB unformatted), and the above 8" controllers to be on the same bus.

As far as "anything else" is concerned, there are mod kits available from Vector to put a 5, 10, and perhaps a 32MB hard disk on a System B or 2600. Hawkeye Graphic also supplies a modified CP/M for the FD/HD controller.

Your could upgrade to a 6MH ZCB - a single board computer. I don't know whether the 2600 is running a Z80 board with Bitstreamer, or a 4MH ZCB.

CLASSIFIED

FOR SALE: Vector 3, Model 2600. Dual 600K drives, Bitstreamer II board, 2 serial ports, over 100 disks, considerable software for CP/M 2.2 (sBASE II, 2 spreadsheets, modem programs, word processors, etc.). System has been under continuous service contract since new. Best offer.

R. Philip Giles, 514 Alda Road, Mamaroneck NY 10543. (914) 698-1481.
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FOR SALE: Micropolis 1053 Dual MOD II disk subsystem (drives/controller/cables) complete with MDOS and Micropolis BASIC, $400. About 60 blank diskettes, some new, some slightly used, $1 each. Diskettes available with/after 1053 subsystem has been sold.

Maintenance manual, never used, $35. Centa Systems CP/M-80, $75.

Louis E. Wheeler, (805) 481-5687, anytime.
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WANTED: S-100 Video Card with addressable cursor. Also want CDS computer. David Montgomery, PO Box 166, Mt. Pocono PA 18344. Phone (717) 839-7707.
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CLASSIFIED (continued)

FOR SALE: Two 8" disk drives, Siemens FDD 200-8. Can run double-sided, double-density or single-sided, single-density. Includes enclosure with power supply. $700 value for $350.

Stan Loeb, POB 3385 Modesto CA 95353. Phone (209) 526-2425 or (209) 523-6865.
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WANTED: Vector 3 Single or multiuser computer. Running or not. Am also interested in spare parts.
Dickson Small, 8731 Glen Nevis NE, ADA MI 49301. Phone (616) 676-9337.
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*            MICROPOLIS/VECTOR GRAPHIC USERS GROUP NEWSLETTER               *
*   Published Monthly by DAMAN, 604 Springwood Circle, Huntsville AL 35803   *
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* For Assistance with general information, MUG/Vector Graphic, DAMAN hardware *
* & software, Micropolis Basic, Basic/z, Micropolis drives & Micropolis parts-*
*                                                                            *
* Call Lynn or Buzz at (205)881-1697 during the Central Times of 9 AM to 9 PM.*
*                                                                            *
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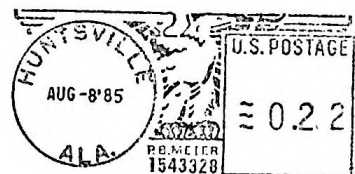
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